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is interesting to those only familiar with the ordinary sequence. The intercalation of Apetalæ among Polypetalæ has long been a much desired change, and it is a good thing to have it put in this concrete way and applied to our North American plants. The changes in generic and specific nomenclature are mostly such as Professor Greene has already indicated in previous papers.

OPEN LETTERS.

The new herbarium pest.

In reference to the article in the December number, 1891, by Prof. C. V. Riley on the "New Herbarium Pest," let me add my experience. Today in looking over duplicates four of the geometrid larvæ were found on Aphyllon Ludovicianum collected in this county in June, 1890. A few drops of a pretty strong solution of corrosive sublimate and arsenic in diluted alcohol were dropped on each. During an examination of the plants for more larvæ or eggs, in about twenty minutes, the liquid had evaporated, and the paper being again dry, I observed to my dismay the little surveyors stretch and move again, slowly at first, but in about five minutes as actively as before their bath. They are now bottled for observations. This extraordinary tenacity of life increases the formidability of this pest.—DR. H. E. HASSE, *Santa Monica, Calif.*

NOTES AND NEWS.

THE STATE OF KANSAS is spending $3500 in spreading the entomophthoral disease of chinch bugs under the direction of Professor F. H. Snow.

PROFESSOR W. C. WILLIAMSON, until recently at Owen's College, Manchester, has changed his residence to 43 Elms Road, Clapham Common, London.

DR. SERENO WATSON died March 9th, at his home in Cambridge, Mass., after a prolonged illness resulting from an attack of "la grippe." No tidings since the death of Dr. Gray will cause botanists profounder sorrow than this.

DR. THOMAS TAYLOR, the United States microscopist, is said to be preparing models of fungi for the Columbian Exposition, to include all the edible varieties of the United States.

THE DECEMBER NUMBER of the *Microscopical Bulletin* contains a very fine photogravure of Bacillus tuberculosis made from a photograph taken with Queen's 1-15 homogeneous immersion lens.

THE UNIVERSITY EXTENSION work of the State University of Iowa embraces twelve lectures on "world-making," four of which are devoted to plants. The botanical lectures are given by Professor T. H. McBride.

Mrs. W. A. Kellerman has been writing very pleasantly about leaf variations, which she has observed from time to time. Several of her articles have appeared in *Science*, in the issues for Jan. 29, Feb. 12, and others.

The herbarium of the University of Minnesota contains about 42,000 plants, including 15,000 spermaphytes. It embraces sets of exsiccati by Ellis, Thümen, Sydow, Roumeguère, Krieger, Rehm, and some others, in the fungi.

Twenty-three Californian weed seeds are illustrated and described by Mr. Hubert P. Dyer in the annual report of the California Experiment Station for 1890, recently issued. The article is part of a graduating thesis.

A certified list of exchanging botanists, classified according to their ability and usual practice in the preparation of herbarium specimens, is being compiled by Mr. J. A. Morton, secretary of the Canadian botanists' correspondence association.

The source of infection for wheat rust is discussed by Professor H.L. Bolley in *Agricultural Science* for last December. He concludes that the uredospores are the chief generators of the rust, and that the wind may carry them very long distances, even hundreds of miles.

A revision of the North American species of Xyris, by Heinrich Ries, is published in the *Bulletin* of the Torrey Botanical Club (Feb.). Fourteen species are described (one new) and their range and synonymy given.

Prof. E. B. Knerr, of Midland College, Atchison, Kansas, will furnish fresh rooted specimens of *Erythronium mesochoreum* Knerr this spring to all who desire them, provided they send ten cents (to cover postage and packing) with their addresses. The plant usually begins to bloom shortly after April 1st.

Mr. Harold Wager of Leeds claims to have demonstrated the presence of a nuclear structure in a species of Bacillus which forms a thin scum on water containing Spirogyra in a state of decay. These researches combined with earlier ones leave little doubt of the presence of a nucleus at least in the more highly organized microbes.

Since the appearance of Kuntze's *Revisio Generum Plantarum* Dr. John Briquet, who is elaborating the Labiatæ for Engler and Prantl's *Natürliche Pflanzenfamilien*, has examined the changes proposed by K. in the generic names of this order. Out of the fifteen suggested he considers five well founded.[1]

Mr. R. E. Fry finds in certain cells of the stem of Euphorbia splendens aggregations of proteid which are "used as a reserve nitrogenous material, answering to starch among carbo-hydrates." Other species of Euphorbia and allied plants do not exhibit aggregations of such material.[2]

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[1] Bot. Centralb. xlix. 106.

[2] Annals of Botany v. 413.

THE OUTLINES of a university extension course of six lectures on the physiology of plants, which is being given at Tomah and Appleton, Wis., by Dr. Charles R. Barnes, have been distributed. The topics of the lectures are as follows: "How plants forage; How plants eat; How plants breathe; How plants grow; How plants move; How plants multiply."

PROFESSOR J. E. HUMPHREY has given in the *American Naturalist* (Dec.), under the title "The comparative morphology of the fungi," a very useful outline view of the conclusions contained in the last four parts of Brefeld's "Untersuchungen aus dem Gesammtgebiete der Mykologie;" views with which not merely every mycologist should be familiar, but every student of botany.

A LEARNED, interesting and suggestive lecture by Mr. Charles F. Cox of New York city, on the question, "What is a diatom?" is given in the January number of the *Journal of the New York Microscopical Society*. It not only answers the question from the technical and biological sides, but presents a strong plea for the toleration and encouragement of the study of pure science, based upon the history of the development of knowledge as influenced by the study of these organisms.

IN THE ANNUAL REPORT of the President of Harvard College, for 1890–91, it is stated that during the year the total number of specimens received by the Herbarium was about 13,000, and the number mounted and distributed 10,995. The total expenditure of the Herbarium was $6329.84, against $3048.60 in 1889–90, and $4493.23 in 1888–89. The additional expenditure of 1890–91 was made possible by the gift of $3500 a year for five years. This gift was made in the hope that it would ensure the completion of the Synoptical Flora.

IN BULLETIN 37 of the Cornell Experiment Station Professor Bailey gives a lucid account of the three species of Physalis which have come into cultivation as fruit-bearing plants, viz., P. pubescens, P. Peruviana and P. capsicifolia.— Prof. Bailey thinks that if some way can be found to make the pepino (Solanum muricatum), a very interesting plant of recent introduction, set fruit more freely in the north it promises to be an acquisition for the kitchen-garden and for market. — He recommends the chorogi (Stachys Sieboldi), the new tuberiferous labiate, for trial in every home garden.

SOME YEARS AGO Van Tieghem demonstrated the existence of invertase in pollen, a ferment which converts cane sugar into glucose. Experiments carried on by Mr. J. R. Green demonstrate the presence of diastase in the pollen of a number of common cultivated plants. Fresh pollen ground up between glass plates and mixed with a thin starch paste produced the usual disappearance of starch and formation of glucose. The ferment acts also when extracted by the glycerine method.[1]

PROFESSOR L. H. BAILEY in an admirable account [2] of the dewberries, shows that they arise from two species of Rubus, R. Canadensis and R. trivialis, of which the former also shows two well marked varieties, roribaccus and invisus. He calls attention again to the fact that the bush blackberry does not have any trailing forms, the so-called var. humifusus having apparently been established upon a dewberry. Apropos of this bulletin we may be permitted to remark that we know of no better model for experiment station botanists than the recent bulletins of the horticultural division of the experiment station of Cornell University.

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[1] Annals of Botany v. 512.

[2] Cornell University Exper. Station, bulletin 34.

AMONG THE BULLETINS of the experiment stations recently received are quite a number upon botanical topics. Dr. C. F. Millspaugh (W. Va., No. 19) writes on weeds, especially their value as fertilizers for the soil when suitably composted. Prof. L. H. Pammel (Iowa, No. 15) gives a very full account of the fungous diseases of the sugar beet, more particularly those caused by species of Uromyces, Cystopus, Cercospora and Rhizoctonia. Fungicides and their specific application are treated by Miss Freda Detmers and Mr. W. J. Green (Ohio, vol. IV, No. 9), Mr. E. G. Lodeman (Cornell, No. 35) and Mr. L. F. Kinney (R. I., No. 14).

THE FOLLOWING tribute is paid to Dr. Geo. L. Goodale in the last annual report of Harvard University: "The development of the botanical establishment of the University during the last ten years may fairly be called extraordinary. It has acquired a large fire-proof museum, to contain not only its collections, but its lecture-rooms and laboratories; has added greatly to its collections and its library; and, at the same time, has obtained larger permanent funds for the support of the combined establishment. Every branch of the work has been developed and enriched. For all this material progress the University is chiefly indebted to Professor George L. Goodale, Director of the Botanic Garden."

TWO NUMBERS of the new *Forstlich-naturwissenschaftliche Zeitschrift* have reached us. In typography they are somewhat disappointing, since they are printed in German type instead of Roman, a step which the majority of scientific men will consider retrogressive, no matter to what nation they belong. The contents of the two numbers is as follows: Dr. Robert Hartig, The sickening and death of pines on account of defoliation by Liparis monacha; Dr. Carl von Tubeuf, The diseases of Liparis monacha; Dr. R. Weber, On the influence of seed production upon the ash constituents and nitrogenous reserve materials of the wood of the red beech; Dr. A. Pauly, On a breeding research with Pissodes notatus; W. Eichhoff, Suggestions as the extermination of insects injurious to forests and field-crops.

MR. SPENCER LEM. MOORE shows[1] that the callus with which sieve plates of the vegetable marrow are closed at the end of the growing season is formed of proteids. The slowness with which some of the proteid reactions take place have caused observers to deny their occurrence. The behavior of the callus with neutral salt solutions and other solvents is like that of coagulated proteids. They can be removed from the sieve-plates by a peptonizing fluid, and in nature their mode of removal strongly suggests the action of a proteolytic ferment, which however has not been isolated. Mr. Moore also finds that the so-called "stoppers" of the cells in the thallus of Ballia callitricha have similar reactions to the proteid tests, except that they do not dissolve under the action of a peptonizing ferment. He considers them of proteid nature, allied to lardacein.

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[1] Journal of the Linnean Society xxvii. 501.

AT A RECENT meeting of the Linnean Society (Jan. 21), Mr. F. E. Weiss read a paper "On the development of the caoutchouc-containing cells of *Eucommia ulmoides*." He found that the bark and leaves of this tree, used medicinally by the Chinese, and called by them "Tu-chung," contain numerous elastic threads of silky appearance, which proved to be of the nature of caoutchouc. They are contained in long unbranching cells, somewhat like latex cells, which are found in the cortex and in the secondary phloem, and accompany in large numbers the ramifying bundles of the leaf and the pericarp. Unlike the ordinary latex cells, they are not derived from specialized cells of the embryo, but originate in all new growths, and can be seen forming in the cortex, the pith and the parenchyma surrounding the bundle of the petiole. They originate in twos, by longitudinal division of a very granular cell, both daughter cells growing out at their two extremities into a long tube, which makes its way along the intercellular spaces by sliding growth. They never contain more than one nucleus, and the large granules of caoutchouc, which soon make their appearance, finally coalesce into a single mass, which has, when the tissues are broken, the appearance of a silky thread. Mr. Weiss regards these cells as a primitive form of latex cells, similar to those from which the more elaborate ones of the ordinary Euphorbiaceæ may have been derived.— *Gard. Chron.*, Feb. 6.

A CONTRIBUTION to the detection and function of tannin is made by Moore in the seventh paper of his series: Studies in vegetable biology.[1] The summary is here reprinted:

1. Nessler's test for ammonia is a valuable aid to the botanist in detecting with certainty and rapidity the presence of tannin and tannic acids in plants. Other fluids having caustic potash for a basis are also good reagents for tannin. 2. Two chief kinds of tannin are to be distinguished according to their behavior with Nessler's fluid: (a) the iron-blueing tannin strikes brown with the fluid; (b) the iron-greening variety is turned yellow by it. 3. The yellow substance just mentioned readily diffuses through the cell wall; this effect is to be ascribed to the caustic potash, for alkaline solutions, even the weakest, will act in the same way. Here we have a provision, by the aid of rain, dew, and activity of soil organisms, for the excretion of tannin from the general surface of plants containing this form of it. 4. In addition to the functions hitherto ascribed to tannin, Haberlandt's recent discovery, with reference to the water-drop exuding on section of Mimosa pudica, renders it probable that tannic acid may have a more general relation to the turgescence of cells. Moreover, tannin is most likely used up in the lignification of the cell wall. 5. The diffusible tannin, although primarily excretory, and the non-diffusible kind when occurring in shed organs, may yet, in view of the fact that tannin can act as a source of carbon to fungi, have some indirect connection, *via* the nutrition of saprophytes, with the metabolism of green plants.

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[1] Journal of the Linnean Society xxvii. 527.

THE HOMOLOGIES of the angiospermous embryo-sac and its contents always form an interesting subject for speculation. The prevalent view at present, that the embryo-sac is a macrospore and its contents a 7 or 8-celled prothallium, is not without objection; not a small one being that it in no way accounts for the conjugation of a micropylar and an antipodal nucleus to form what is known as the definitive nucleus. The formation of an 8-celled prothallium by nuclear division is perfectly clear; but the conjugation of two of these nucli is in no way explained by the ordinary view. Warming and Vesque consider that the eight nuclei produced within the embryo-sac represent two sets of four macrospores derived from two sporocytes, the embryo-sac thus becoming a special spore-mother-cell. Marshall Ward has advanced the view that the eight nuclei correspond to two 4-celled prothallia. Gustav Mann, however, in the Proc. Roy. Bot. Soc. of Edinburgh (June, 1891), who has been investigating the whole subject as exemplified by *Myosurus minimus*, has a hypothesis to suggest, which, so far as we know, is the first that has attempted to explain the double conjugation which takes place in the embryo-sac. He believes that the micropylar half of the embryo-sac corresponds to four female spores or macrospores; and the antipodal half to four male spores or microspores. Two of these eight cells conjugate, giving rise to the endosperm-cell, which must be looked upon as producing a true embryo, but which being weaker than the embryo resulting from cross-fertilization (of oosphere and pollen-nucleus), has become modified to serve as a storehouse for the stronger embryo. Such a theory would also play its part in suggesting explanations of apparent parthenogenesis and polyembryony. There is no doubt but that our views of the homologies of these parts must be modified; whether they will take the direction so ingeniously suggested by Mr. Mann is another matter.